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Geographic Information Systems (GIS)

Selected Applications in Government

An Annotated Bibliography of Publications and Websites

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Introduction

As geographic information systems (GIS) applications continue to become established in mainstream government programs such as tax mapping, environmental and land use planning, infrastructure management, and transportation systems, increasing development is becoming apparent in non-traditional areas such as health and human services, economic development, parks and recreation, and public safety.

In the course of our work in building GIS programs with local governments in southeastern New York State, we are often asked about examples of GIS applications in villages, towns, and cities. In response to these requests, we initially decided to publish an annotated bibliography on GIS applications in hardcopy format. However, we modified the traditional hardcopy format to include a Web link so the document could be used electronically. Links and citations are intended to be illustrative examples and users are encouraged to conduct further Web research for examples which may be more germane to certain disciplines. Information included the document was obtained by utilizing the ***Go Express*** search engine and was found to be accessible as of August 1, 2000.

Overall, the document is intended for both new and existing GIS users in context of providing basic information on a range of government GIS applications. Reviewer comments and suggestions are welcome and Westchester County GIS encourages distribution of the document. It is anticipated other GIS programs, including the expanding use of the global positioning system (GPS) will be included in future revisions of the document.

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Chapter 1

Public Health

Croner, Charles M., Ph.D. "Public Health GIS News and Information". Nov. 1999, No. 31. < http://ehasl.cvmbs.colostate.edu/CDCGIS31nf.html >.

Prepared in outline form, *"Public Health GIS and News Information"* is a technical bulletin providing a broad overview of GIS applications in the area of disease control and prevention through the uses of GIS. The bulletin, published by the National Center for Health Statistics at Colorado State University provides a summary of up-to-date GIS news, calendar of events, training opportunities, and professional contacts.

"GIS and Public Health". ***Centers for Disease Control and Prevention.*** **13 July 2000. < http://www.cdc.gov/nchs/about/otheract/gis/gis_home.htm >.**

The U.S. Department of Health and Human Services offers a web site designed to provide the health community and the Nation Center for Health Statistics (NCHS) with information on GIS. This page provides links to several areas in the health region. For example, Public Health GIS News and selected maps.

"GIS for Health Care Today and Tomorrow." ***Arc User.*** **30 Apr. 1999. < http://www.esri.com/news/arcuser/0499/umbrella.html >.**

Published in ESRI's quarterly magazine *ArcUser*. the article's author discusses existing and anticipated benefits of GIS technology in public health care applications. Examples in the areas of hospitals, medical centers and health insurance organizations are provided. GIS software ArcView and BodyViewer are reviewed.

"GIS in Public Health: Using Mapping and Spatial Analysis Technology for Health Protection". ***Agency for Toxic Substance and Disease Registry (ATSDR).*** **11 May 2000. < http://www.cdc.gov/phtn/gis/crsedescription.htm >.**

This is a training network satellite broadcast and through its training a better understanding of GIS technology in public health application will be reached. Providing the reader with goals, objectives, tasks, speakers and more you are able to grasp the concept of GIS' importance. Targeted for public health professionals skilled at computer use.

"GIS in Public Health: San Diego 1998". 12 Aug. 1998. http://www.atsdr.cdc.gov/GIS/conference/index.html >.

A past Geographic Information System in Public Health Conference is discussed. The development and application of GIS has modernized the spatial analysis in the world of disease along with the environmental contaminants. The GIS tool is an easy and very effective way for analyzing data sets

that relate to one another by geographic location. This announcement offers the reader a brief summary of GIS and how it will be used in conferences.

"GIS for Research and Planning". *Health*. 9 Feb. 1999. <
http://www.esri.com/industries/health/res_plan.html >.

This web page provides a summary and example of GIS health applications in disease tracking, site and facility inspections, program evaluation, spatial data visualization, and community assessments. The GIS software reviewed includes ArcView, ArcInfo, Atlas GIS, *Business*MAPPRO, and BodyViewer. A good site for GIS health care beginners.

Laymon, Paul; GIS Coordinator. "Spatially Enabling Vital Health Data". *Arc User*. 30 Apr.1999. < http://www.esri.com/news/arcuser/0499/vital.html >.

GIS Coordinator Paul Laymon states that GIS makes health care more cost-effective and helps with management activities. Examples of the geocoding process are given. GIS software applications include ArcInfo, and ArcView.

McKenna, Ed. "GIS Takes Flight in Public Health Sector." *Washington Technology* 26 Apr. 1999. < http://www.wtonline.com/voll4_no2/tech_features/491-1.html >.

This article discusses how GIS is continuing to become a vital tool in investigating and reporting the cause of deadly diseases around the world. The continuing growth of GIS is characterized and the definition of what exactly GIS is capable of doing is defined. An excellent introductory article on GIS use in public health.

Muschkin, Clara and Carolyn Christman. "Health Access GIS Database". *McMillan and Moss Research*. < http://www.mcmoss.org/healthaccess.html >.

McMillan and Moss Research are developing a health access databases for North Carolina and South Carolina, GIS technology will integrate demographics, geography and economic information for the health industry. By naming each health care facility and mapping its location through GIS, database information on services, special interests, and insurance will be available (MapXtreme is included as a GIS software product). Included in the article are sample data and several web links into different specialty areas.

Long Island Breast Cancer Study Links

Anderson, Linda. "The Long Island Breast Cancer Study Project." *National Cancer Institute*. 23 Feb. 2000. < http://www.dccps.ims.nci.nih.gov/LIBCSP/objectives.html >.

Director of the *National Cancer Institute*, Linda Anderson provides an overview of the Long Island Breast Cancer Study Project. This "objectives" website is intended to give its audience guidance to the GIS features and capabilities in the project. Included are functions for spatial analysis, temporal analysis, and space and time interactions. GIS software programs such as ArcInfo, Intergraph, MapInfo, AutoCAD, and AutoGIS are noted. This article is specifically for those who understand GIS as it relates specifically to the Long Island study.

"Background/Goals/Objectives: Attachment 2".
< http://camp.nci.nih.gov/dccps/liproject/background.htm >.

Giving the background, goals and objectives of GIS, this attachment gives a proposal for Phase I of the Long Island Breast Cancer Study Project (LIBCSP). Services and materials provided in the

LIBCSP include: GIS software, GIS data conversion services, GIS database in support of the GIS-H, GIS-H operation, maintenance and support, and several others.

"GIS-H System Requirement: Statement of Work Attachment 3".
< http://camp.nci.nih.gov/dccps/liproject/sow.htm >.

An overview of technical specifications and reporting requirements for the federally funded Long Island Breast Cancer Study. Will be useful for experienced GIS users only.

***Silent Spring Institute, INC.* "Silent Spring Institute GIS". 1997.**
< http://www.silentspring.org/Projects/Capestudy/GIS/GIS.html >.

The Silent Spring Institute is home base for the Cape Cod Breast Cancer Project. Good, basic homepage describing objectives and use of GIS in this Cape Cod study. Basic overview of GIS concepts is provided as well as an overview of Silent Spring's involvement in the study.

Other Related Links

Dodge, Martin and Sean White. "GIS and Public Service in Wales: Analyzing Supply and Demand for Health Care and Education". *Mapping Awareness Journal*. Vol. 9, No. 7 Sep. 1995.
< http://www.geog.ucl.ac.uk/casa/martin/mapping_awareness/mapping_awareness.html >.

A public service project in Wales uses GIS to document the supply and demand of healthcare services. Further examination of the relationship between health care needs versus the provision and accessibility of specific healthcare services is examined.

Gatrell, Anthony C. and Markku Loytonen and Yves Guermond and Michel Bussi and Frederic Bizet and Aline Demczuk and Gerard Rushton and Lyly Teppo. "Abstracts of Papers Presented at the Speculation Meeting on GIS and Health". *GIS and Health Research in Europe*. <http://www2.shef.ac.uk/uni/academic/D-H/gis/healabs.html >.

Authors provide a summary and review of abstracts for papers presented at the Speculation Meeting on GIS and Health. Paper illustrates the many important and evolving uses of GIS in the health sciences, particularly in the European setting. Provides links to the European Science Foundation Social Science Programme.

Kennedy, Heather; ESRI Technical Support. "Mapping Health Care Networks". *Arc User*. 30 Apr. 1999. **< http://www.esri.com/news/arcuser/0499/access.html >.**

ESRI technical support staff reviews an ArcView-based application called *Patient Access* which deals with the relationship between patient and provider locations.

Noorani, Noor-Amin and Hussain Ali A. Al-Sayegh. "A GIS for Health Care in Qatar." *Al-Khabar*. Vol. 1 No. 3, Fall 1996.
< http://www.gisqatar.org.qa/alkhabar/fall96/p7.html >.

Dr. Noor-Amin Noorani, GIS Coordinator for Health, and Mr. Hussain Ali A. Al-Sayegh, Editor-in-Chief of the magazine *Al-Khabar* explain the future need and expectations for GIS in the health field. This article states positive goals for the Qatar health community and is very relevant to the endless applications of GIS.

Parker, Elisabeth. "GIS and Health Care Management: Issues of Accessibility in Lothian Region". ***GIS Work in Health Care.***
< http://home.echo-on.net/~cnorth/health.html >.

A Masters Dissertation from the University of Edinburgh discusses the role of GIS in the health care system in a Lothian region. A two-part study evaluates both existing and future uses of GIS tools and analysis in the health sciences.

Sharp, Brian Dr. "GIS in Health". ***The Health GIS Centre.***
< http://www.mrc.ac.za/giscentre/geoinfo.htm >.

This page is designed to introduce concepts of GIS and provide adequate examples of how GIS technology has been applied to the health field, as well as giving types of spatial data and other related links to useful sites. A discussion on the two primary spatial data formats (vector and raster) is also included.

"Use of GIS/GPS in a Malaria Epidemiology and Entomological Study".
< http://www.esarl.tulane.edu/mali.htm >.

Malaria is a major cause of childhood mortality in sub-Saharan Africa. ESARL and the TMRC (Tropical Medicine Research Center, a conjoint project between Tulane University School of Public Health and Tropical Medicine, and Malaria Research and Training Center in Mali) are conducting an epidemiological and entomological study. The study site is the village of Bancoumana, Mali. ESARL deployed a GPS field station to the study site so that epidemiological and entomological data can be integrated with GIS/GPS (Geographic Information Systems/Global Positioning Systems) data.

Chapter 2

Social Services

Beaver, Julie. "GIS and Welfare Reform Programs".
< http://www.maximus.com/akmap.html >.

This site provides an overview of various welfare reform programs utilizing GIS with specific reference to the Ohio Empowerment Zone/Enterprise Community Subsidized Employment Program (EZSEP). Geographic Information Systems are used to establish the locations of higher paying positions in relation to the location of these welfare recipients. A visual exhibit is included.

Huang, Charles Dr. "GIS Application on Social Research". ***GIS in Social Research.***
< http://www.interorg.com/gisrearch.htm >.

A brief summary of the author's work using GIS in several socioeconomic and demographic studies in the metropolitan New York City area. Discussion include the New York City urban ecology study, evaluation of youth services' needs and services in Brooklyn and an analysis of school performance in the NYC public school system.

Driscoll, Christin M. "Food Research Action Center Anti-Hunger Initiative: Day Care Providers Tackle Welfare Reform with GIS". ***Calliper Corporation.***
<http://www.caliper.com/Press/frac.htm >.

A press release on a Food Research Action Canter (FRAC) project which utilizes GIS to locate, or geocode, the addresses of the program applicants, determine the Census block groups in which those addresses are located, and determine if those block groups meet the eligibility requirement for federal funding.

Plunkett, Andrew. "GIS as a Tool to Identify Demand for Welfare Services and Plan for Delivery of Those Services". 10 June 1998.
< http://www.sli.unimelb.edu.au/HealthGIS98/presentations/plunkett/sld001.htm >.

Site includes a 10-frame slides highlighting the use of GIS in welfare services including children services, crisis services, child protection, and facility support. Basic background information on GIS is also provided as well as the identification of other potential social service GIS applications.

"MedicareMapper". ***GeoHealth, Inc.***
<http://www.geohealth.com/medmapper.html >.

This gives an overview of the MedicareMapper application which is basically a lightweight GIS application wrapped around a large database. The GIS component makes it easier to "see" and understand large spatially indexed datasets. Data provided comes from the Health Care Finance Administration (HCFA) and is the Hospital Market Service Area File and contains Medicare discharge data. This discharge data contains Medicare charges, bed days and number of cases aggregated to the ZIP code level. This file displays Medicare information by provider for the entire nation.

Moakley, Joseph J. " Access to Jobs Database". *GeoGraphics Laboratory.* 24 Nov. 1999.
< http://geolab.moakley.bridgew.edu/home/accesstojobs.asp >.

As a part of the Welfare to Work program, GIS has become a very helpful and powerful resource in this Massachusetts application. Application functionality, databases, and software components are identified.

"Geographic Information System (GIS): A Service of the Child Care Automation Research Center". *Child Care Bureau Technology Tips.* 1 Nov. 1999.
< http://www.acf.gov/programs/ccb/systems/gis.htm >.

Good overview of the use of GIS in the administration, management and planning of child care programs. Benefits and applications in GIS include visualization of supply and demand of childcare, welfare-to-work programs, locating service providers, major employer locations, and demographic data. An introduction to GIS concepts is also included.

Queralt, Magaly and Ann D. Witte. " A Map for you". *Geographic Information Systems in the Social Services.*
<http://library.northernlight.com/PN19980929010003689.html?inid=eS0iOXtgbD0IcwceBmEIWgFWU0UDGhRFcwx%252BFA%253D%253D#doc >.

Excellent article as an introduction to GIS applications in the areas of social services. Provides examples of GIS applications in the States of Florida and Massachusetts. Basic GIS benefits and an overview of the technology is included. Article must be purchased before it can be completely downloaded.

"US Department of Housing and Urban Development Community 2020 HUD Community Planning Software". *Calliper Corporation*.
< http://www.caliper.com/ushud.htm >.

Homepage for HUD's Community 2020 GIS application which utilizes Maptitude software and a wide range of census data. This desktop application focuses on mapping the locations of community development activities in context of other socioeconomic and demographic variables.

Other Related Links

Beaver, Julie. "What is Geographic Information Systems (GIS)?"
< http://www.maxinc.com/gis_web.html >.

An excellent reference from a government contractor (Maximus) which uses GIS to understand the geographic implications of providing services to clients. In this context, a GIS is an advanced software technology that enables users to conduct geographically based analyses of demographic and health and human service program data. A powerful feature of a GIS is the ability to overlay multiple map layers of data to show geographically based relationships that would not be apparent through a tabular examination of the same data.

Dodge, Martin and Sean White. "GIS and Public Services in Wales: Analyzing Supply and Demand for Healthcare and Education". *Mapping Awareness Journal*. Vol. 9, No. 7. Sep. 1995.
<http://www.geog.ucl.ac.uk/casa/martin/mapping_awareness/mapping_awareness.html>.

A major GIS-based research project into the provision of public services in Wales has been in progress since October 1994 in the Department of City and Regional Planning at Cardiff University. The aim of the project is to create a set of interrelated spatial databases documenting the supply and demand for selected public services in Wales. The research is funded by the Higher Education Funding Council for Wales (HEFCW).

"Labor Cost Map". *Edgetech Americas, Inc.* 28 Sep. 1999.
< http://www.edgetech-us.com/Map/MapLbrCost.htm >.

Site by a GIS contractor (Edgetech America) which illustrates how GIS can be used in evaluating the geographic distribution of the multiple parameters that influence both the quality and quantity of the labor force**.**

Lacombe, Annalynn. "Determining Transits Needs". *National Transit Resource Center.*
< http://www.ctaa.org/ntrc/atj/pubs/innovative/innov2.shtml >.

Excellent article and example of a GIS application which determines transit needs for welfare recipients in a welfare-to-work context. Examples from both a Cleveland, Ohio and St. Mary County, Maryland are included in the discussion project are provided.

Peterson, Sue and Faye Lohr. "New Direction: Five States Forging Ahead". *National Transit Resource Center.* < http://www.ctaa.org/ntrc/atj/pubs/states-move/section-4.shtml >.

In this article, five state projects are highlighted (Michigan, New Jersey, Ohio, Pennsylvania and Virginia). Through GIS analysis, welfare agency officials to act as "travel agents" for their clients. Clients are booked on paratransit buses as well as provided with immediate access to schedule and route information for existing fixed-bus routes. Similar GIS-based applications are also included in both urban and rural settings.

"Wages Planning and GIS". *Florida Department of Children and Families.* 1 May 2000.
< http://www.sfrpc.com/whatsnew/wages.htm >.

This project uses geographic information system (GIS) to assess access to jobs and public transportation resources for public assistance recipient living in south Florida. Project products will include the development of database(s) and appropriate map(s) showing the spatial relationship of key data elements (e.g., client, employment/employers, and transportation). Intent of the project is to determine regional access to transportation resources, regional journey to work linkages, discover how well transportation resources meet work trip needs.

Witte, Ann Dryden. "GIS and Child Care Subsidy Data (slide #12)". *Jobs, Wages and Child Care Subsidies.* < http://www.fiu.edu/~wittea/Tuesday/sld012.htm >.

Good slide show presentation illustrating the use of GIS in analyzing the relationship between jobs, wages and childcare services. Several maps are included.

Chapter 3

Economic Development

The Affordable Space Locator Service (ASLS). ***South of Market Foundation.***
< http://www.gisplanning.com/asla.html >.

The Affordable Space Locator Service (ASLS) is an application to assist small businesses to locate commercial space in San Francisco's South of Market Area. Developed by GIS Planning for the South of Market Foundation, it provides detailed spatial information at a variety of levels and a detailed space report listing the real estate broker.

This application was created by GIS Planning using Avenue and the new dialog designer extension. The dialogs allow the user to select an available property based on a range of criteria, to enter the client information, and to add to or delete a space from the database. This application also automatically connects with Microsoft Access in order to provide customized business reports. The application is updated monthly.

VEDIS Background. ***VEDIS.*** **< http://209.21.13.19/sites/vallejo/background.html >.**

The Vallejo Economic Development Information System (VEDIS) is an Internet application by GIS Planning, Inc. This project provides information services to businesses that are interested specifically in the City of Vallejo. The City of Vallejo Economic Development Division uses public accessible information to greatly facilitate economic development of the community. Programs include ArcView and MapServer (IMS), and other ESRI products.

McNeely, Tim and Alice Chow and Mike Skowronek. A GIS for Economic Development in Staten Island. 17 May 1996.
< http://geography.hunter.cuny.edu/gismo/News9606/SIEDC.html >.

The Staten Island Economic Development Corporation (SIEDC) developed a GIS application which would provide information to companies looking to relocate their business to Staten Island. Application includes data on environmental conditions, infrastructure, zoning, and available land. Article provides good background and other detailed information.

City Assists in Economic Development. ***Bluefield.*** **1 June 2000.**
< http://www.ci.bluefield.wv.us/gis/gis-econdev.htm >.

The City of Bluefield, West Virginia has developed a small GIS application to assist in economic development efforts in the city. This home page describes overall functionality of application and provides links to other city GIS programs.

Irwin, Elena. Using GIS as an Economic Development Tool. 14 Dec 1999.
< http://www-agecon.ag.ohio-state.edu/comregecon/gis/gisintro.htm>.

An excellent site providing the basics of GIS in the area of economic development. Key economic development factors are explained as well as providing an overview of other important and basic GIS concepts. Other GIS links are provided.

EDgeMaker for ArcView GIS. ***EdgeTech America, Inc.*** **2 Aug 1999.**
< http://www.edgetech-us.com/ >.

EDgeMaker for ArcView add-on software designed to help economic developers (ED) and real estate professionals promote their territory or properties. EDgeMaker combines the benefits of traditional database, multimedia and GIS systems with a more user friendly interface. The application provides being economic developers, consultants, corporate real estate executives and real estate agents the ability to inventory available buildings, sites and existing industries geographically; analyze, market and present available buildings and sites using GIS; and gain a competitive edge by improving and speeding service while reducing costs.

Steger, Wilbur A. Defining the New Regional Economy: Why the Old Way Had To Go.
URISA: Economic Development and IT/GIS. **2000.**
< http://www.urisa.org/99Conference/economic_development_and_it.htm >.

This article discusses thirteen people and their view on the topic of GIS and economic development. This article defines the new world of regional economic development including several statements discussing the use and limitations of GIS technology. GIS use has been proven to increase economic growth and attract businesses.

Other Related Links

Campbell, Jeff and Jim Schriever. Using a GIS in Habitat Conservation Planning. ***Pacific Meridian Resources.***
< http://www.businessmap.com/library/userconf/proc96/TO150/PAP148/P148.HTM >.

A paper discussing the practices of land management and how the use of GIS is helpful in developing habitat conservation plans. Included in this category are managing decisions on soil, air, water, fish and wildlife and their related economic impacts. Theses issues are addressed at the watershed, landscape and regional scales. Data from a variety of GIS data layers are incorporated and existing information from several sources are integrated. Using the GIS databases the wide range examination of environmental, economic and social factors affecting land management are examined. Concluding questions and answers are offered.

Geographically Information Systems (GIS) Component. ***CIAT-UNEP Environmental and Sustainability Indicators.*** **18 July 1997.**
< http://www.ciat.cgiar.org/indicators/txtonly/unepciat/giscomp.htm >.

An overview of a GIS project in Latin America and the Caribbean. The objective of the GIS component in this project is to create a spatial database of economic, social and environmental indicators at continental and national level for Latin America and the Caribbean. These data will be accessible for display and analysis (e.g. spatial query and overlay, basic statistics, data update) via a graphical user interface.

Mellinger, Andrew D. and Jeffrey D. Sachs and John L. Gallup. Climate, Water Navigability, and Economic Development. ***CID Working Paper.*** **No. 4 Sep 1999.**
< http://www.cid.harvard.edu/cidwp/024.htm >.

An academic paper on Geographic information systems (GIS) being used on a global scale to examine the relationship between climate (ecozones), water navigability, and economic development in terms of GDP per capita.

Misra, Bidhanesh. Geographic Information System and Economic Development: Conceptual Applications/edited. *Vedams Books International.*
< http://www.vedamsbooks.com/no12485.htm >.

Published hardcopy book (India) covering a wide range of GIS and economic development concepts. Chapters are case studies of by various authors covering economic development applications in both rural and suburban settings.

Taylor, David. Resources, Wildlife and Economic Development. 6 Jan 2000.
< http://www.gov.nt.ca/RWED/rs/ >.

A good site illustrating the integration of GIS technology with economic development considerations in the rural Northwest Territories. The Northwest Territories Centre (NTC) for Remote Sensing was created for the needs of remote sensing and geographic information systems regarding resources, wildlife and economic development. The NTC provides its users with access to classified remote sensing and GIS along with promoting its use in all areas. Software includes ARC/INFO GIS, SPANSGIS, ARC/VIEW and more.

Zhou, Qiming. The Integration of GIS and Remote Sensing in Regional Economic Planning.
The University of New South Wales.
< http://geog.hkbu.edu.hk/Qzone/Research/Papers/ADVRS93A.htm >.

Another site illustrating the use of GIS and related technology in rural economic development applications. The Asian Development Bank (ADB) project produced a regional economic development plan using regional datasets and a collection of spatial models on soil erosion, economics, and rural development.

Chapter
4

Law Enforcement

Blair, Bruce R. "GIS & GPS: Emerging Technologies in Law Enforcement". *Montgomery County Department of Police*.
< http://www.co.mo.md.us/services/police/Tech/geoconf2.htm >.

This is a report from the Montgomery County (Maryland) Department of Police. Article provides and excellent overview of both GIS and GPS technologies in the field of law enforcement. Examples are provided as well as possible scenarios in which both of the technologies can be applied. The conclusion states future challenges, including a way to make hardware small, within budget, integrated, flexible and supported by low maintenance.

Nelson, Lew. "GIS A Powerful Weapon for Law Enforcement: Arguably the Most Powerful Weapon in Law Enforcement is Information Technology". *ARCUser*. 21 Jan 1999.
< http://www.gisday.com/news/arcuser/0199/umbrel.html >.

Allowing the integration and analysis of law enforcement data, GIS is increasingly being used to help identify and apprehend potential criminal suspects. Agencies use GIS to better utilize information more sufficiently. Article also includes examples. GIS software identified includes MapObjects, ArcView and CrimeView including spatial analysis examples.

Cheetham, Robert. "Philadelphia Police Go Online to Fight Crime". *ARCNews Online*. 4 Feb 1999. < http://www.esri.com/industries/lawenforce/05-philapolice.html >.

The Philadelphia Police Department's Crime Analysis and Mapping Unit began using GIS in 1997. Using ArcView, a wide range of incident data including homicide, aggravated assault, property crimes, vehicle crimes, rapes, robberies and narcotic arrests is now available in a central GIS database.

"Mapping Crime: Principle and Practice". *National Institute of Justice*. 12 1999. 8 Feb. 2000.
< http://www.ojp.usdoj.gov/nij/pubs-sum/178919.htm >.

This NIJ Research Report introduces the science of crime mapping to police officers, crime analysts, and other people interested in visualizing crime data through the medium of maps. Not a technical guide to software, *Mapping Crime: Principle and Practice* presents a broad approach and addresses the kinds of questions crime mapping can answer and how it can answer them. More than 110 colorful maps illustrate how geographic information systems (GIS) are used to analyze crime problems. The appendix lists 50 Internet resources related to crime mapping, including Web sites displaying crime maps, GIS and analysis software, hot spot identification methods, sources of census data, and virtual reality viewers.

"Law Enforcement Use of GIS". *Salinas Police Department.*
< http://www.salinaspd.com/gis_vb.html >.

In October of 1995, the Salinas Police Department received a grant to implement an innovative problem solving program to combat Youth Firearms Violence. The grant, administered through the Office of Community Oriented Policing Services (COPS), allowed the City of Salinas and the Police Department to build a mapping and analysis application using GIS technologies.

Rose, S. Mariah. " Mapping Technology Takes a Bite Out of Crime". *GEOTech Media*. June 1998.
<http://www.vgin.vipnet.org/documents/articles/localgovt/Mapping_Technology_Takes_a_Bite_out_of_Crime.htm >.

Article provides an overview of the various uses of GIS technology in the field of law enforcement. Included in the article are a variety of maps and graphics illustrating crime analysis and crime related data. Areas highlighted in the article include Charlotte-Mecklenburg, San Diego, Brooklyn North and Cleveland.

"Why GIS for Law Enforcement?". *Greater Atlanta Data Center*. 1999.
< http://gadc.kennesaw.edu/whygis.htm >.

Site offers a list of technology tools, including GIS, which are effective in the law enforcement field. Because of spatial analysis capabilities, the Greater Atlanta Data Center deployed GIS to support community policing, crime analysis and prevention, mapping crime trends, and a wide range of community /neighborhood watch efforts.

"Geography Matters to Law Enforcement and Criminal Justice". *ESRI*. 7 June 2000.
< http://www.esri.com/industries/lawenforce/lawenforce.html >.

Law enforcement response capabilities and efficiencies really greatly on the ability of public safety agencies to distribute and share resources quickly and effectively. To this end, this article illustrates how GIS software is used to integrate and access immense amounts of location-based information. Article illustrates how GIS is used to assist law enforcement activities in the areas of emergency response, analyzing special events and prediction models/scenarios.

Mamalian, Cynthia A. and Nancy G. LaVigue and Staff of the Crime Mapping Research Center. " The Use of Computerized Mapping by Law Enforcement". *National Institute of Justice*. Jan 1999. < http://www.ojp.usdoj.gov/nij/pubs-sum/fs000237.htm >.

Summary article from the National Institute of Justice's Crime Research Center (CMRC) that identifies which law enforcement agencies are (and are not) involved in GIS applications. Though GIS use in the law enforcement community is growing rapidly, specific reasons on why agencies do not use GIS are included in the article. Available in full text through ASCII or Adobe Acrobat.

Other Related Links

"About GIS for State and Local Government". *ESRI*. 30 June 1999.
< http://www.esri.com/library/gis/locgov/locgov1.html >.

GIS has become common in all areas of state and local governments. Article states that in law enforcement, GIS can be used to aid crime prevention through displaying patterns of incident data as well as the location and frequency of crimes. An example of how the City of Yakima uses GIS and law enforcement is given. When properly designed and implemented, GIS can also illustrate temporal and spatial trends within the spatial data sets.

Cho, George and Eugene Clark. "Geographic Information Systems: Mapping the Contours of the Law". *The Journal of Law and Information Science*.
< http://www.comlaw.utas.edu.au/law/jlis/gis_map.html >.

The Journal of Law and Information Science is a biannual, international, cross-disciplinary journal devoted to law and information technology. This paper proposes a research agenda to examine the contours of the law in relation to the use, development and dissemination of GIS. The economic, political and social significance of GIS in an information age gives rise to emerging policy and legal issues including rights and responsibilities, intellectual property in information products, liability in tort and contract, access, privacy and the right to know. The results arising from the study of these issues may provide solutions to difficult legal and practical problems which policy-makers will face and can ill-afford to ignore. Such signposts may help define the contours of the law in an Information Age.

"Criminal Division Office of Administration Geographic Information Systems Staff Homepage". ***United States Department of Justice*****. 30 Mar 2000.**
< http://www.usdoj.gov/criminal/gis/ >.

U.S. Department of Justice, Criminal Division, Office of Administration Geographic Information Systems (GIS) Staff homepage. This portion of the U.S. Department of Justice Homepage is intended to provide you with a brief summary of the GIS Staff's services and to share the results of the GIS Staff's GIS pilot projects.

Etheredge. Betty. "Special Projects". ***Central Midlands Council of Government.*** **1999.**
< http://www.cmcog.state.sc.us/gis.html >.

Newberry County's 911 emergency calling system, launched summer of 93, was completed in March of 1995. The unique project utilized the Council's Geographic Information System (GIS) and satellite readings in the computer mapping of the county's 15,000 residential and commercial structures. The project was designed to tie all addresses and telephone customers in the county to an ArcView 2.1 computerized mapping system. Located in the dispatcher's office at the County Law Enforcement Center, the speed of arrival and help had increased. Roads that were previously unidentified were mapped, named and added to project GIS.

Giblin, Matt and Natalie Kroovand and Nicole Chapman and Jon Grant. "Making a World of Difference through Information Technology".
< http://www.spea.indiana.edu/jgant/Crime_Statehouse/tsld016.htm >.

Slideshow which contains slides specific to the increasing use of GIS in crime analysis and mapping. Basic and very good introductory to GIS concepts in the crime analysis and law enforcement fields. Good background information for the beginner.

"GIS is Airborne in the Law Enforcement". ***MetaMAP*****. 31 July 1998.**
< http://www.metamapgis.com/press/0731981.htm >.

Featured at the Airborne Law Enforcement Association (ALEA), MetaMAP Inc.'s MetaVUE product Press release on the MetaVUE product which includes aerial photography, GPS, and traditional GIS mapping functions. Article specifically illustrates use of the technology in the field of crime analysis and emergency response. MetaVUE hardware gives law enforcement the ability to have complete access to their community's full GIS system data.

"Law Enforcement". ***Semcor-Information Systems and Services GIS.***
< http://corpweb.semcor.com/gis/solutions/industry/law_enforcement.html >.

Web site of the Semcor which provides customized applications in the area of crime analysis and related law enforcement GIS applications. With GIS tools, law enforcement agencies are able to conduct a wide range of analysis and crime tracking/mapping functions.

"Police and Sheriffs". ***ESRI*****. 28 Jan 1999.**
< http://conservation.esri.com/industries/lawenforce/police_sheriff.html >.

ESRI marketing literature on the basic uses of GIS in the area of law enforcement. ESRI software packages are identifies and well as links to business partners specializing in law enforcement GIS applications.

Walsh, Trudy. "GIS app Fingers high-crime areas in Austin". ***Government Computer News State and Local.*** **Apr 1999.**
< http://www.gcnstateandlocal.com/archives/sl/1999/April/1a.htm >.

Basic review of preliminary GIS mapping applications and use in Austin, Texas. Using the GIS, analysts can forecast crime patterns and incidents. Article cites several examples of using GIS in the department and includes some very early cost figures. Software discussed includes ArcView 3.1 and ArcView Spatial Analysis.

Chapter 5

Fire Response

Kloepfer, Jay. ids Teams with Irving Fire Department to Deliver GIS Field Data. June 1996.
< http://www.idsmaps.com/pr3.html >.

Irving, Texas distributes existing geographic information system (GIS) data to both office and field personnel in **ids** format (proprietary software format) using CD-ROM or PCMCIA network media and Microsoft® Windows™-based viewing software. This low-cost information delivery service allows users to access up-to-date GIS data easily and quickly from virtually anywhere in the office or field.

Conley, Julie B. and Tim Lesser. ESRI Presentation Paper. *ESRI*. July 1998.
< http://www.ci.winston-salem.nc.us/fire/infoproj/esripc.htm >.

The City of Winston-Salem's Integrated Network Fire Operations (I.N.F.O.) Project, funded through matching funds from a TIIAP grant from the Department of Commerce, facilitates communication among all Fire Stations and provides critical information in graphical form to the fire fighters in emergency vehicles. ISDN technology provides the backbone for the network. The City has built a street centerline file utilizing Global Positioning Satellite (GPS) technology to provide the routing framework. GIS software utilizes the centerline network and alarm location to define an optimal route. Other graphical information is also displayed, such as the locations of hydrants, railroads, streams, and schools.

GIS Assists Fire Department in Incident Pre-planning, Inspection, Response. *Bluefield Fire Department.* < http://ci.bluefield.wv.us/gis/gis-fireservice.html >.

Bluefield Fire Department has found GIS to be an excellent tool to improve its response and pre-planning capabilities. Single buildings or entire neighborhoods may be studied in the classroom to determine problem areas, distances, accessibility, etc. By querying data to classify buildings by occupancy class, or construction type, for example, the Fire Inspection Bureau is able to determine the concentrations of particular occupancies and to plan visits accordingly.

Anderson, Larry B. Operational Divisions: Planning. *Medford Fire & Rescue Department.*
< http://www.ci.medford.or.us/fire/planning.html >.

With an overview of the planning division at Medford fire and rescue department, where GIS is used to assist in the coordination and management of programs, as well as for traditional mapping applications. The department also utilizes *FireRouter* software for analysis functions.

Brewer Fire Department Receives Livable Communities Grant. *City of Brewer*. 12 Nov 1999.
<http://www.brewerme.org/Technology/technolo1.htm >.

The Brewer Fire Department was the 1999 recipients of the Public Safety Livable Communities Grant from ESRI. Description of hardware, applications and GIS data within the department are also described.

Fire Agencies Improve Response with GIS. *ARCUser*. 31 Jan 2000.
< http://www.gisday.com/news/arcuser/0100/firetools.html >.

An ESRI *ARCUser* article which provides a broad overview of GIS applications (and justifications) in both rural and urban areas. Article discusses how GIS improves fire response by centralizing data, and how it is quickly delivered and easy to access. Agency examples are provided as well as the specific ESRI software products which are utilized.

PlanSight's GIS Services. *Fire & Emergency*.
< http://www.plansight.com/services/fire.html >.

This site gives a brief description and outline of GIS in the fire and emergency response field. Being able to organize information on your community, plan for emergencies, access maps and data, etc., GIS can help the fire agencies in several ways. Examples include maps of danger zones, address mapping, and preplanning (scenarios). Good introductory background.

Other Related Links

Allen, David. Fire Hydrant Maintenance Using GPS and GIS. *ARCUser*. 31 Jan 2000.
< http://www.esri.com/news/arcuser/0100/hydrant.html >.

The City of Euless, Texas is using both GPS and GIS technology to familiarize its' firefighters with fire hydrant locations. By integrating both attribute and spatial data, firefighters have access to valuable and mission critical data. The final hydrant information includes an ID, street address, size of feeder main, fire response zone, model of hydrant, fire district, station closest, and latitude and longitude. Other benefits include being able to tell which hydrant is down and to identify ones that require maintenance.

Allen, Sarah G. and David Akehrlein and David Shreve and Richard Krausse. Interactive Application of GIS During the Vision Wildfire. *Point Reyes National Seashore*.
< http://www.businessmap.com/library/userconf/proc96/TO300/PAP289/P289.HTM >.

A wildfire spread rapidly through the Point Reyes National Seashore in the fall of 1995, burning over 12,000 acres. During and immediately following the fire, Geographic Information Systems (GIS) and Global Positioning Systems (GPS) were utilized to monitor the daily/hourly spread of the fire, measure fire suppression actions, assess damage to natural resources, and evaluate damage to adjacent homes in the wildland/urban interface. Examples of GIS/GPS data layers created included fire intensity, bulldozer lines, and fire perimeter over time.

Chapter 6

Parks & Recreation

Hou, Yuhong. GIS Application for City Parks in New Haven. *Central Connecticut State University*.
<http://localhost:1234/HLPage?pg=http%3A//library.ctstateu.edu/ccsu_theses/1493.htm&ht=GIS+and+Parks&method=GET&reqdata= >.

An initial GIS application with the New Haven (CT) parks department. In addition to building a user interface for non-technical users, the application provides basic GIS mapping and analysis tools for land use planning.

Duiker, Marco. Geographical Information System and Recreation. *BORIS*.
<http://localhost:1234/HLPage?pg=http%3A//www.kicrecreatie.agro.nl/english/boris/intro.html>.

This article introduces GIS as modern computer cartography, where all geographical context can be taken into account. Recreation planning and their spatial development has only been a recent GIS technology. The steps to how GIS can help and what it can do are given, along with examples. The program in Europe and North America dealing with Recreational planning is called BORIS and the National Government of the Netherlands offers more information on BORIS is available.

Hurlbert, Dan. Geographic Information Systems Approach to Trails Management in Shenandoah National Park, Virginia.
< http://www.nps.gov/gis/apps/shen/shen_trails1.html >.

GIS was used in Shenandoah National Park to assist in trail damage assessment following two significant events: Hurricane Fran in September, 1996 and a major ice storm in January, 1998. Assessment criteria included trail degradation factors such as erosion and vegetative encroachment, concentration of down trees and debris, conditions and locations of bridges, as well as condition of retaining walls and cribbing.

Parks, Reserves and Protected Areas. *ESRI*. 23 July 1998.
< http://www.esri.com/conservation/links/parks.html >.

ESRI Environmental Conservation Program operates a nationwide grant program to all US National Parks, which has helped take the service from just a few GIS-enabled parks at the start of the program to over *200* GIS-capable parks today. Thanks to support from the NPS GIS office in Colorado and a national network of NPS technical coordinators, GIS applications in the parks have exploded in recent years, as the list of papers and online maps below will show. ECP also grants to state parks, and all other types of protected areas and reserves worldwide.

An Example of GIS Applications in Public Policy at the Palo Alto Battlefield National Historic Site Management Zoning Scheme as Defined in the Site's Management Plan.
< http://www.nps.gov/gis/apps/paal/paal.html >.

A GIS database of resource information was created to aid in the general management plan (GMP) process for Palo Alto Battlefield National Historic Site and will continue to serve as a monitoring tool after the plan has been completed. Information was gathered from a variety of sources, including regional, state, and national agencies and existing maps and documents, and individuals.

Other Related Links

Musselman, Curtis. Using GIS for General Management Planning at the Gettysburg National Military Park. *Gettysburg National Military Park*. 2 June 1998.
< http://www.nps.gov/gis/apps/gett/gett_landscape.html >.

At the Gettysburg National Military Park, the National Park Service (NPS) is using GIS tools to support a new General Management Plan (GMP). Data from GIS will include the understanding of park resources, terrain identification and alternative management plans. Article provides an overview of the GIS development effort, as well as examples of maps and other data generated.

Slocumb, Bill. GIS in the National Park Service. *The National Park Service*. 14 Apr 2000.
< http://www.nps.gov/gis/NPS_overview.html#parks >.

The NPS has developed a program to help parks build GIS databases and to provide the expertise needed to use GIS for making park management decisions. The GIS Program provides a technical support network and coordinates GIS use throughout the parks. The Program is organized into three levels: a national program office, regional technical support centers, and park-based GIS.

Chapter 7

Community Service

Alibrandi, Marsha. "GIS as a Tool in Interdisciplinary Environmental Studies: Student, Teacher, and Community Perspectives". *North Carolina State University.* 1996-1998. 19 <http://www.ncsu.edu/meridian/jun98/feat2-3/feat2-3.html >.

This article describes to the reader GIS' as an environmental community service project. In this interdisciplinary project both students and adult community members took part in monitoring water quality. The goal of GIS in community service is discussed along with issues and problems that arise with technology and education. Further recommendations are offered.

"GIS for Community Service: Higher Education". *ESRI.* 18 June 1998. <http://www.esri.com/industries/university/comm_serv.html >.

Many universities are using GIS to provide important services to their communities. Some universities have used GIS to plan bikeways for the community, some have helped with routing of meals-on-wheels deliveries for the elderly, and others have provided the community with access to information on locations of toxic waste sites. A university can provide an important service to the local community by combining the strengths of GIS and the World Wide Web to create a civic network. Web-based civic networks are an important first step in creating a "societal GIS" where citizens have access to a wide range of spatially referenced data about their community. Article is ESRI marketing literature.

Lewis, John. "CADIS". *University of Arkansas.* <http://www.cast.uark.edu/local/cadis/ >.

The Community Asset and Development Information System (CADIS) is a project that brings together the private and public sector to create a high quality geographic information system for Northwest Arkansas. The Center for Advanced Spatial Technologies at the University of Arkansas, in conjunction with software vendors and business provide an extensive suite of information about the region to the counties, communities and businesses of the area.

McIntyre, Lionel. "Community Development". *Urban Technical Assistance Project (UTAP).* < http://www.columbia.edu/cu/earl/volunteer/16.html >.

UTAP uses the resources of its Geographic Information System (GIS) and the Columbia research community at large to aid NYC planning efforts related to community development and other activities. Types of technical assistance include project development, advanced GIS research, and in-service support such as client training, survey implementation, and planning workshops.

"The GIS Team". *Riverside's GIS.* <http://www.ci.riverside.ca.us/gis/Default.htm >.

This is the City of Riverside's page on Geographic Information Systems. An excellent example on using GIS in several areas of local government and community services.

Chapter 8

GIS Links

http://www.gis.com/

One of the most comprehensive and useful GIS web sites covering a wide range of introductory and advanced topics on GIS use in government and industry. Something for everyone.

http://www.gislinx.com/

Provides GIS users with a variety of information on several issues. With over 1,700 links, this site offers a resource for all GIS needs. Broken into topics for an easy search.
Last Updated: 07-11-00

http://www.index-site.com/gis.html

Three pages of GIS and Mapping related sites. Over 150 summarized links.
Last updated: 07-08-00

http://www.gisportal.com/gis3q.htm

Over 50 links to GIS related sites, plus several other GIS associated information.

http://www.geoplan.ufl.edu/weblinks.html

GIS web links on GIS with summaries of each link. Also included are links to GPS, Remote Sensing and Imagery, Applications Development and Internet Map Servers.
Last Updated: 08-03-99

http://www.esri.com/industries/k-12/k-12.html

This ESRI site links you to sites and informative links on GIS and libraries.

http://www.gisportal.com/gis3a.htm

Links to the basic classic GIS "Hotlink" sites.

http://www.gisconnection.com/links/results.asp

GIS links broken into sections of General GIS, Government, Employment and Academic GIS.

http://www.cerc.cr.usgs.gov/morap/links.html

Offers the use of GIS links in categories of Data, Labs, Links, Miscellaneous, Natural Resources and Software/Hardware.
Last Updated: 05-23-00

http://www.civilsolutions.com.au/gislinks.htm

Categorized GIS links in the areas of Vendor, How-To, Data and Books.
Last Updated: 07-15-00

http://www.geosolutions.com/gislinks.html

A GeoSolutions site to 14 links that lead to other GIS related websites. A summary of the pages is given.

http://www.ci.boulder.co.us/openspace/gis_lab/links.htm

From the City of Boulder, favorite links to GIS websites, Data, Software and Conservation Resources.
Last Updated: 09-30-99

http://www.grsgis.com/~grs/links.html

GIS links that may direct you to other links and a lot of data. Broken into sections of Federal, Imagery, Private/Corporate, Software, Special Organizations, Sate, Universities, Intergraph, ESRI, Bentley and MapInfo links.
Last Updated: 10-99

http://www.scaug.org/links.html

GIS links from the South Central Arc User Group. Also offers GIS information from within this given link.
Last Updated: 07-10-00